

Andrew Schechtman-Rook, Ph.D.

rook166@gmail.com — (917)-836-4267

SUMMARY

- 8+ years of experience with analysis of large, complex datasets.
- Strong programming, numerical analysis, and visualization skills.
 - Extensive familiarity with linear and non-linear model fitting.
- Experience writing software for both parallel and distributed environments.
 - Able to work independently as well as part of a team.
- Practiced writer and speaker for technical and non-technical audiences.

SKILLS

Programming: C++, Python (including Matplotlib, MySQL-python, Numpy, pyMC, Scikit-learn, Scipy), R, Unix shell scripting.

Databases and Web Design: Django, HTML, MySQL, PHP.

Operating Systems: Linux, Mac OS X.

Data Analysis: Bootstrapping; genetic algorithms; image processing and machine vision; interpolation; linear and non-linear regression; Markov Chain Monte Carlo; numerical integration and differentiation; parallel and distributed computing; principal component analysis; rootfinding.

Oral Presentations: Gave talks describing advanced analysis and modeling to both expert and non-expert audiences.

Writing: Published research in leading peer-reviewed scientific journals (see below for selected publication list).

PROFESSIONAL EXPERIENCE

Postdoctoral Research Associate

2014-Present

University of Wisconsin-Madison

- Devised new metrics to determine the cause of mis-match between numerical models and astronomical data.
- Implemented a Voronoi Tessellation algorithm to maximize spatial resolution and signal in adaptively binned images.
- Constructed advanced visualization tools to aid in the refinement of data processing techniques.
- Trained and mentored undergraduate and graduate students in programming, data analysis and statistical methods.

Research Assistant

2007-2013

University of Wisconsin-Madison

- Developed non-linear Levenberg-Marquardt χ^2 fitting algorithms to constrain models of spiral galaxies to data.
- Employed on-campus distributed computing resources to perform large-scale modeling in parallel, using over 20 years of computer time in 1 month.
- Created a genetic algorithm to efficiently fit galaxy models with unusually large numbers of free parameters to high-resolution images.
- Utilized frequency-domain analysis to understand the spatial distribution of galactic structure.
- Computed descriptive statistics about 200+ astronomical objects from raw survey data automatically via custom-built analysis software.
- Implemented methods comparing different fitting statistics to compute global best-fitting parameters for multiple datasets.
- Discovered and classified a previously unknown galaxy by simultaneously using data from seven different sources.

- Teaching Assistant** 2008-2009
 University of Wisconsin-Madison
- Taught six discussion sections of an introductory undergraduate astronomy course.
 - Prepared engaging lesson plans, including interactive demonstrations and group problem-solving activities.
- Research Assistant** 2006-2007
 Case Western Reserve University
- Designed and executed statistical analyses of simulated galaxy clusters to optimize strategy for future data acquisition.
 - Used nearest-neighbor and regression analysis to compute a transform between astronomical filter systems.
- Physics Lab Assistant** 2005-2006
 Case Western Reserve University
- Maintained existing equipment and computers for introductory physics labs.
 - Developed and built components for new labs.
 - Upgraded hardware and software for over 20 lab computers.

OTHER RELEVANT EXPERIENCE

- Independent NFL Analyst** 2013-Present
 phdfootball.blogspot.com
- Performed novel statistical analyses on publicly available NFL data.
 - Mined a play-by-play database containing over 500,000 records across dozens of tables for complex relationships between individual players as well as teams.
 - Developed custom software and visualization tools to efficiently examine hundreds of thousands of individual plays.
 - Explained findings in a manner accessible to all audiences through both written posts and evocative figures.

EDUCATION

- Ph.D., Astronomy, University of Wisconsin-Madison December 2013
- Wisconsin Space Grant Consortium Graduate Fellowship
 - International Astronomical Union Travel Grant
 - American Astronomical Society Chambliss Student Award
 - University of Wisconsin-Madison Astronomy Department Whitford Award
- MS, Astronomy, University of Wisconsin-Madison June 2009
 BS, Astronomy, Case Western Reserve University May 2007
- Graduated *cum laude*
 - Minors in Physics and Classics

SELECTED PUBLICATIONS

- Schechtman-Rook, A.** & Bershad, M. A., “Near-Infrared Structure of Fast and Slow Rotating Disk Galaxies”, 2014, *in prep*
- Schechtman-Rook, A.**, Ph.D. Dissertation: “Lifting the Dusty Veil: Understanding the Stellar Structure of Spiral Disks”
- Schechtman-Rook, A.** & Bershad, M. A., “Near-infrared Detection of a Super-thin Disk in NGC 891”, 2013, *ApJ*, 773, 45
- Schechtman-Rook, A.** & Hess, K. M., “NGC 4656UV: A UV-selected Tidal Dwarf Galaxy Candidate”, 2012, *ApJ*, 750, 171
- Schechtman-Rook, A.**, Bershad, M. A., & Wood, K., “The Three-dimensional Distribution of Dust in NGC 891”, 2012, *ApJ*, 746, 70